

TECHNICAL SPECIFICATIONS

SECTION 01010 - SUMMARY OF WORK

PART 1 - GENERAL

101.01 GENERAL

A. The WORK to be performed under this Contract shall consist of furnishing all tools, equipment, materials, supplies, and manufactured articles and for furnishing all transportation and services, including fuel, power, and water for the performance of all labor, WORK, or other operations required for the fulfillment of the Contract in strict accordance with the Contract Documents.

101.02 WORK COVERED BY CONTRACT DOCUMENTS

A. The WORK of this Contract includes furnishing and installing flow meters and butterfly valves with appurtenant items in accordance with the drawings and these specifications. Appurtenant items include but are not limited to:

1. Removal and disposal of existing equipment as specified on the project drawings.
2. Supply and installation of new electronic actuated valves and associated apparatuses as specified on the project drawings.
3. Modifications to steel piping, as required, to install the new equipment.
4. Paint new piping and any existing piping disturbed by the WORK.
5. Repair interior lining of pipe where disturbed.
6. Clean and restore the facility to its pre-construction condition.

101.03 CONTRACT METHOD

A. The WORK, hereunder, will be constructed based on lump sum prices.

B. The CONTRACTOR shall include the General Conditions and Supplementary General Conditions of the Contract as a part of all of its subcontract agreements.

101.04 WORK BY OTHERS

A. INTERFERENCE WITH WORK ON UTILITIES:

The CONTRACTOR shall cooperate fully with all utility forces of the OWNER or forces of other public or private agencies engaged in the relocation, altering, or otherwise rearranging of any facilities which interfere with the progress of the

SECTION 01010 - SUMMARY OF WORK

WORK, and shall schedule the WORK so as to minimize interference with said relocation, altering, or other rearranging of facilities.

101.05 WORK SEQUENCE

A. WORK under the Contract shall be scheduled and performed in such a manner as to result in the least possible disruption of water service.

B. The CONTRACTOR shall have all of his materials necessary to make a connection present at the site of WORK prior to interrupting water service, if any interruption becomes necessary.

C. The CONTRACTOR shall give notice to the OWNER of intent to start WORK at least 14 days prior to mobilization to the site. The OWNER will then notify the affected parties and assist by isolating any necessary valves. The CONTRACTOR shall not operate any of the OWNER's valves.

D. WORK shall be performed during November 9, 2026 through December 16, 2026. All work shall be completed prior to December 16th and testing shall be performed prior to this date.

101.06 CONTRACTOR USE OF PROJECT SITE

A. The CONTRACTOR's use of the project site shall be limited to its construction operations, including on-site storage of materials, on-site fabrication facilities, and field offices.

101.07 OWNER USE OF THE PROJECT SITE

A. When the CONTRACTOR's WORK involved rehabilitation of or extension to the existing facilities, the OWNER may utilize all or part of the existing site and existing facilities during the entire period of construction for the conduct of the OWNER's normal operations. The CONTRACTOR shall cooperate with the OWNER/ENGINEER to minimize interference with the CONTRACTOR's operations and to facilitate the OWNER's operations. In any event, the OWNER shall be allowed access to the project site during the period of construction.

101.08 PROJECT MEETINGS

A. PRECONSTRUCTION CONFERENCE:

Prior to the commencement of WORK at the site, a preconstruction conference will be held at a mutually agreed time and place which shall be attended by the CONTRACTOR, its superintendent, and its subcontractors as appropriate. Other

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attendees will include OWNER Representative, ENGINEER and designated project representative, representatives of other utilities affected by the WORK, others as requested by CONTRACTOR, OWNER, or ENGINEER.

B. The purpose of the conference is to designate responsible personnel and establish a working relationship. Matters requiring coordination will be discussed and procedures for handling such matters established. This agenda will include the following:

1. CONTRACTOR'S tentative schedules.
2. Transmittal, review, and distribution of CONTRACTOR's submittals.
3. Processing applications for payment.
4. Maintaining record documents.
5. Critical Work sequencing.
6. Field decisions and Change Orders.
7. Use of project site, office and storage areas, security, housekeeping, and OWNER's needs.
8. Major equipment deliveries and priorities.
9. CONTRACTOR's assignments for safety and first aid.

C. The ENGINEER will conduct the preconstruction conference and will arrange for keeping the minutes and distributing the minutes to all persons in attendance.

D. **PROGRESS MEETINGS:**

The CONTRACTOR shall schedule and hold regular on-site progress meetings at least weekly and at other times as requested by ENGINEER or as required by progress of the WORK. The CONTRACTOR, ENGINEER, and OWNER shall be represented at each meeting. CONTRACTOR may at its discretion request attendance by representatives of its suppliers, manufacturers, and subcontractors.

E. The CONTRACTOR shall conduct the meetings and provide for keeping and distribution of the minutes. The purpose of the meetings will be to review the progress of the WORK, maintain coordination of efforts, discuss changes in scheduling, and resolve other problems which may develop.

SECTION 01010 - SUMMARY OF WORK

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

- END OF SECTION -

SECTION 01025 - MEASUREMENT AND PAYMENT

PART 1 - GENERAL

101.01 SCOPE

A. Payment for various items of the Bid Sheets, as further specified herein, shall include all compensation to be received by the CONTRACTOR for furnishing all tools, equipment, supplies, and manufactured articles, and for all labor, operations, and incidentals appurtenant to the item of WORK being described, as necessary to complete the various items of the WORK all in accordance with the requirements of the Contract Documents, including all appurtenances thereto, and including all costs of compliance with the regulations of public agencies having jurisdiction, including Safety and Health Requirements of the Occupational Safety and Health Administration of the U.S. Department of Labor (OSHA). No separate payment will be made for any item that is not specifically set forth in the Bid Schedule, and all costs therefore shall be included in the prices named in the Bid Schedule for the various appurtenant items of WORK.

101.02 APPLICATION FOR PAYMENT

A. Application for Progress Payment shall be submitted in accordance with Article 14 of the General Conditions of this Contract.

101.03 LUMP SUM ITEMS

A. No separate measurement of quantities will be made for those items of WORK performed on a lump sum basis, but the item will be constructed, complete, as required to complete the WORK shown on the Drawings and as described in the Specifications.

B. Bid prices for lump sum items represent the total cost to the OWNER. Such price shall constitute full compensation for furnishing and placing of materials required to complete the item, and for all labor, equipment, tools and incidentals needed to complete the WORK in conformity with the plans and specifications.

SECTION 01025 - MEASUREMENT AND PAYMENT

101.04 UNIT PRICE ITEMS

A. Determination of the actual quantities and classifications of Unit Price WORK performed by CONTRACTOR will be made by the ENGINEER in accordance with individual sections of specifications. Payment will be for actual quantities and at the price stated in the Bid. Estimated quantities in the Bid are not guaranteed and are solely for the purpose of comparison of Bids and determining an initial Contract Price.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

- END OF SECTION -

SECTION 01300 - CONTRACTOR SUBMITTALS

PART 1 - GENERAL

101.01 REQUIREMENT

A. Wherever submittals are required hereunder, all such submittals by the CONTRACTOR shall be submitted to the ENGINEER.

B. Within 14 days after the award of Construction Contract, the CONTRACTOR shall submit the following items to the ENGINEER for review:

1. A preliminary construction schedule indicating the starting and completion dates of the various stages of the WORK.
2. One electronic copy of the manufacturer's technical submittal information for the following items:
 - a. Butterfly valves with electric actuators.
 - b. Flow meters.
 - c. Pipe specials, fittings, couplings, and additional waterline apparatuses.
 - d. Paint and coating systems.
3. A list of all permits and licenses the CONTRACTOR shall obtain indicating the agency required to grant the permit and the expected date of submittal for the permit and required date for receipt of the permit.
4. CONTRACTOR shall verify all submitted items meet the project specifications prior to submission of submittals to the ENGINEER for review.

101.02 CONTRACTOR'S SCHEDULES

A. TIME OF SUBMITTALS:

At the preconstruction conference, the CONTRACTOR shall submit for acceptance by the ENGINEER, a preliminary construction schedule for the WORK, showing its general plan for orderly completion of the WORK, showing its general plan for orderly completion of the WORK and showing in detail its planned mobilization of plant and equipment, sequence of early operations, and timing of procurement of materials and equipment. The construction schedule produced and submitted shall indicate a project completion date on or before the contract completion date. The

SECTION 01300 - CONTRACTOR SUBMITTALS

ENGINEER within 14 days after receipt of the preliminary construction schedule, shall meet with a representative of the CONTRACTOR to review the preliminary plan and construction schedule. After review by ENGINEER, revise and resubmit as required.

B. CONSTRUCTION SCHEDULE REVISIONS:

Submit revised schedules with each Application of Payment, reflecting changes since previous submittal.

101.03 PROPOSED SUBSTITUTES OR EQUAL ITEMS

A. For convenience in designation in the Contract Documents, any material, product, or equipment to be incorporated in the WORK may be designated under a brand or trade name or the name of a manufacturer and its catalog information. The use of any substitute material, product, or equipment which is equal in quality and utility and possesses the required characteristics for the purpose intended will be permitted, subject to the following requirements:

1. The burden of proof as to the quality and utility of any such substitute material, product, or equipment shall be upon the CONTRACTOR.
2. The ENGINEER will be the sole judge as to the quality and utility of any such substitute decision shall be final.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

- END OF SECTION -

SECTION 01400 - QUALITY CONTROL

PART 1 - GENERAL

101.01 SITE INVESTIGATION AND CONTROL

A. The Contractor shall verify all dimensions the field and shall check field conditions continuously during construction. The Contractor shall solely be responsible for any inaccuracies built into the work due to his failure to comply with this requirement.

B. The Contractor shall inspect related and appurtenant work and shall report in writing to the ENGINEER any conditions which will prevent proper completion of the work. Failure to report any such condition shall constitute acceptance of all site conditions, and any required removal, repair, or replacement caused by unsuitable conditions shall be performed by the Contractor at his sole cost and expense.

101.02 DESCRIPTION OF WORK

A. The work shall be conducted under the general observation of the ENGINEER and shall be subject to inspection by representatives of the OWNER to ensure strict compliance with the requirements of the Contract Documents. Such inspection may include mill, plant, shop or field inspection, as required. The ENGINEER shall be permitted access to all parts of the WORK, including plants where materials or equipment are manufactured or fabricated.

B. The presence of the ENGINEER or any inspector(s), however, shall not relieve the Contractor of the responsibility for the proper execution of the WORK in accordance with all requirements of the Contract Documents. Compliance is a duty of the Contractor and said duty shall not be avoided by any act or omission on the part of the ENGINEER or any inspector(s).

C. All materials and articles furnished by the Contractor shall be subject to rigid inspection, and no materials or articles shall be used in the WORK until they have been inspected and accepted by the ENGINEER or his authorized representative. No WORK shall be backfilled, buried, cast in concrete, hidden, or otherwise covered until it has been inspected by the ENGINEER or is authorized representative. Any WORK so covered in the absence of inspection shall be subject to uncovering. Where uninspected WORK cannot be uncovered, such as in concrete cast over reinforcing steel, all such WORK shall be subject to demolition, removal, and reconstruction under proper inspection, and no addition payment will be allowed, therefore.

SECTION 01400 - QUALITY CONTROL

101.03 TIME OF INSPECTION AND TESTS

A. Except as otherwise provided in these specifications, performance of the required tests will be by the OWNER, and all costs therefore will be borne by the OWNER at no cost to the Contractor; except, that the costs of any test which shows unsatisfactory results shall be borne by the Contractor. Whenever the Contractor is ready to backfill, bury, cast in concrete, hide, or otherwise cover any WORK under the contract, he shall notify the ENGINEER not less than 24 hours in advance to request inspection before beginning any such WORK of covering. Failure of the Contractor to notify the ENGINEER at least 24 hours in advance of any such inspection shall be reasonable cause for the ENGINEER to order a sufficient delay in the Contractor's schedule to allow time for such inspections and any remedial or corrective WORK required, and all costs of such delays, including its effect upon other portions of the WORK, shall be borne by the Contractor.

101.04 RIGHT OF REJECTION

A. The ENGINEER, acting for the OWNER shall have the right, at all times and places, to reject any articles or materials to be furnished hereunder which, in any respect, fail to meet the requirements of these specifications, regardless of whether the defects in such articles of materials are detected at the point of manufacture or after completion of the WORK at the site. If the ENGINEER or inspector, through an oversight or otherwise, as accepted materials or WORK which is defective or which is contrary to the specifications, such material, no matter in what stage or condition of manufacture, delivery, or erection, may be rejected by the ENGINEER for the OWNER.

B. The Contractor shall promptly remove rejected articles or materials from the site of the WORK after notification of rejection.

C. All costs of removal and replacement of rejected articles or materials as specified herein shall be borne by the Contractor.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

- END OF SECTION -

SECTION 01500 - CONSTRUCTION FACILITIES AND ENVIRONMENTAL CONTROLS

PART 1 - GENERAL

101.01 GENERAL

A. The Contractor shall provide and maintain adequate construction facilities and perform the necessary work to minimize the impact and inconvenience of the construction activities.

101.02 SANITARY FACILITIES

A. Provide and maintain required facilities and enclosures in accordance with Part 1926 of the OSHA Standards for Construction.

101.03 BARRIERS AND ENCLOSURES

A. Provide as required to prevent public entry to construction areas, and to protect existing facilities and adjacent properties from damage from construction operations.

B. Provide barricades as required by governing authorities for public rights-of-way and for public access to existing building.

C. Provide barriers around trees and plants designated to remain. Protect against vehicular traffic, stored materials, dumping, chemically injurious materials, and puddling or continuous running water.

101.04 PROTECTION OF INSTALLED WORK

A. Provide temporary protection for installed products. Control traffic in immediate area to minimize damage. Repair or replace at OWNER's option any installed work damaged by traffic, the public, or Work operations.

B. Prohibit traffic on restored lawn and landscaped areas.

SECTION 01500 - CONSTRUCTION FACILITIES AND ENVIRONMENTAL CONTROLS

101.05 DUST, WATER AND NOISE CONTROL

A. Surface Water, Erosion and Sediment Control:

1. Surface water shall be controlled so that the construction area is not allowed to become wet from runoff from adjacent areas. Surface water shall be directed away from these areas but not directed toward adjacent property, buildings, or any improvement that may be damaged by water. Surface water shall not be allowed to enter sanitary sewers.
2. Maintain excavations free of water. Provide and operate pumping equipment.
3. Prevent erosion and sedimentation.
4. Provide temporary measures such as beams, dikes, and drains, to prevent water flow.

B. DUST CONTROL:

1. Dust control measures shall be implemented by application of water to all work areas, storage areas, haul and access roads, or other areas affected by construction.
2. All work shall be in compliance with the Federal, State, and local air pollution standards, and not cause a hazard or nuisance to personnel and the public in the vicinity of the work.
3. Provide and operate at least one mobile tank sprinkling unit or other positive means to prevent air-borne dust from dispersing into atmosphere.
4. Other methods of dust control for haul and access roads may include chemical treatment, light bituminous treatment or other method as approved by the ENGINEER.
5. Execute work by methods to minimize raising dust from construction operations.

C. NOISE CONTROL:

1. Execute construction between the hours as allowed unless otherwise approved by OWNER.

SECTION 01500 - CONSTRUCTION FACILITIES AND ENVIRONMENTAL CONTROLS

101.06 CONSTRUCTION CLEANING

- A. All public and private areas used as haul roads shall be continuously maintained and cleaned of all construction caused debris such as mud, sand, gravel, soils, pavement fragments, sod, etc. Care shall be taken to prevent spillage on haul routes. Any such spillage shall be removed immediately, and the area cleaned.
- B. Public roads shall be maintained in accordance with applicable ordinances and regulations.
- C. Through all phases of construction, including suspension of work, and until final acceptance of the project, the Contractor shall keep the work site clean and shall remove daily all refuse, dirt, damaged materials, unusable materials, and all other trash or debris that he has created from his construction activities.
- D. Materials and equipment shall be removed from the site as soon as they are no longer necessary; and upon completion of the work and before final inspection, the entire work site shall be cleared of equipment, unused materials, and rubbish so as to present a satisfactory clean and neat appearance. All cleanup costs shall be included in the Contractor's Bid.

101.07 PROJECT IDENTIFICATION

- A. NOT USED

101.08 TRAFFIC REGULATION

- A. Comply with all requirements of the applicable governmental organization responsible for regulating traffic including creating, submitting for review approval, and maintaining an appropriate traffic control plan.
- B. Control vehicular parking to prevent interference with public traffic and parking, access by emergency vehicles, and OWNER's operations.
- C. Monitor parking of construction personnel's vehicles. Maintain vehicular access to and through parking areas.
- D. Prevent parking on or adjacent to access roads or in non-designated areas.
- E. Provide trained and equipped flagmen to regulate traffic when construction operations or traffic encroach on public traffic lanes.
- F. Use flares and lights during hours of low visibility to delineate traffic lanes and to guide traffic.

SECTION 01500 - CONSTRUCTION FACILITIES AND ENVIRONMENTAL CONTROLS

- G. Consult with authorities, establish public thoroughfares to be used for haul routes and site access.
- H. Confine construction traffic to haul routes and designated construction limits.
- I. Provide traffic control at critical areas of haul routes to regulate traffic, to minimize interference with public traffic.
- J. At approaches to site and on site, install at crossroads, detours, parking areas, and elsewhere as needed to direct construction and affected public traffic.
- K. Relocate as work progresses, to maintain effective traffic control.
- L. Maintain traffic flow to private driveway during entire contract period.
- M. Post-mounted traffic control and informational signs, traffic cones and drums, flagman equipment: as approved by local jurisdictions.
- N. Where local jurisdictions have no requirements, construct, and erect according to "Manual on Uniform Traffic Control Devices for streets and Highway" (MUTCD).
- O. Remove equipment and devices when no longer required. Repair damage caused by installation. Remove post settings to a depth of three feet.

101.09 FIELD OFFICE

- A. NOT USED

SECTION 01500 - CONSTRUCTION FACILITIES AND ENVIRONMENTAL CONTROLS

101.10 REMOVAL

- A. Remove temporary materials, equipment, services, and construction prior to Substantial Completion inspection.
- B. Clean and repair damage caused by installation or use of temporary facilities. Remove underground installations to a depth of two feet; grade site as indicated. Restore existing facilities used during construction to specified, or to original, condition.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

- END OF SECTION -

SECTION 01600 - MATERIAL AND EQUIPMENT

PART 1 - GENERAL

101.01 GENERAL

- A. It is the responsibility of the Contractor to provide products as specified in the Contract Documents free from manufacturer defects or damage from shipping.

101.02 PRODUCTS

- A. Products include all material, equipment, and systems.
- B. Comply with specifications and referenced standards as minimum requirements.
- C. Components required to be supplied in quantity within a specification section shall be the same and shall be interchangeable.
- D. Do not use products removed from an existing structure, pipeline, etc., except as specifically required, or allowed, by Contract Documents.

101.03 TRANSPORTATION AND HANDLING

- A. Transport products by methods to avoid product damage; deliver in undamaged condition.
- B. Provide equipment and personnel to handle products by methods to prevent damage.
- C. Promptly inspect shipments to assure that products comply with requirements, quantities are correct, and products are undamaged.

101.04 STORAGE AND PROTECTION

- A. Store products in accordance with manufacturer's instructions. Store sensitive products in weather-tight enclosures; maintain within temperature and humidity ranges required by manufacturer's instructions.

SECTION 01600 - MATERIAL AND EQUIPMENT

- B. For exterior storage of fabricated products, place on sloped supports above ground. Cover products subject to deterioration with impervious sheet covering; provide ventilation to avoid condensation.
- C. Store loose granular materials on solid surfaces in a well-drained area; prevent mixing with foreign matter.
- D. Arrange storage to provide access for inspection. Periodically inspect to assure products are undamaged and are maintained under required conditions.

101.05 PRODUCT OPTIONS

- A. Products Specified by Reference Standards or by Description Only; Any product meeting those standards.
- B. Products Specified by Naming One or More Manufacturers with a Provision of Substitutions: Submit a request for substitution for any manufacturer not specifically named.
- C. Product Specified by Naming Several Manufacturers: Products of named manufacturers meeting specifications: no options, or substitutions allowed.
- D. Products Specified by Naming Only One Manufacturer: No options, no substitutions allowed.

101.06 PRODUCTS LISTS

- A. Within 10 days after date of Owner-Contractor Agreement, submit complete list of major products proposed for use, with name of manufacturer, trade name, and model number (if applicable) of each product.

101.07 SUBSTITUTIONS

- A. Only within 15 days after date established in Notice to Proceed will ENGINEER consider requests from Contractor for substitutions. Subsequently, substitutions will be considered only when a product becomes unavailable due to no fault of Contractor.

SECTION 01600 - MATERIAL AND EQUIPMENT

- B. Document each request with complete data substantiating compliance of proposed substitution with Contract Documents.
- C. Request constitutes a representation that Contractor:
1. Has investigated proposed product and determined that it meets or exceeds, in all respects, specified product.
 2. Will provide the same warranty for substitution as for specified product.
 3. Will coordinate installation and make other changes which may be required for WORK to complete in all respects.
 4. Waives claims for additional costs which may subsequently become apparent.
- D. Substitutions will not be considered when they are indicated or implied on shop drawing or product data submittals without separate written request, or when acceptance will require substantial revision of Contract Documents.
- E. ENGINEER will determine acceptability of proposed substitution and will notify Contractor of acceptance or rejection in writing within a reasonable time.
- F. Only one request for substitution will be considered for each product. When substitution is not accepted, Contractor must provide specified product.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

- END OF SECTION -

SECTION 01700 - CONTRACT CLOSEOUT

PART 1 - GENERAL

101.01 CLOSEOUT PROCEDURES

- A. Comply with procedures stated in General Conditions of the Contract for issuance of Certificate of Substantial Completion.
- B. When Contractor considers WORK has been reached final completion, submit written certification that Contract Documents have been reviewed, WORK has been inspected, and that WORK is complete in accordance with Contract Documents and ready for ENGINEER's review.
- C. In addition to submittals required by the conditions of the Contract, provide submittals required by governing authorities, and submit a final statement of accounting giving total adjusted Contract Sum, previous payments, and sum remaining due.
- D. ENGINEER will issue a final Change Order reflecting approved adjustments to Contract Sum not previously made by Change Order.

101.02 FINAL CLEANING

- A. Execute prior to final inspection.
- B. Clean and flush drainage systems.
- C. Clean site; sweep paved areas, rake clean other surfaces.
- D. Remove waste and surplus materials, rubbish, and construction facilities from the Project and from the site.

101.03 PROJECT RECORD DOCUMENTS

- A. Provide completed record drawings and other required closeout documents prior to requesting final payment.
- B. Store record documents separate from those used for construction.
- C. Keep documents current; do not permanently conceal any WORK until required information has been recorded.
- D. At Contract closeout, submit documents with transmittal letter containing date, Project title, Contractor's name and address, list of documents, and signature of Contractor.

SECTION 01700 - CONTRACT CLOSEOUT

101.04 OPERATION AND MAINTENANCE DATA

- A. Provide data for:
 - 1. Mechanical equipment and controls.
 - 2. Painting and coating systems.
- B. Submit digital copy of the operation and maintenance manuals prior to requesting final payment for the project.

101.05 MAINTENANCE AND GUARANTEE

- A. The Contractor shall comply with the maintenance and guarantee requirements contained in Article 13.01 of the General Conditions.
- B. Replacement of earth fill or backfill, where it has settled below the required finish elevations, shall be considered as a part of such required repair work, and any repair or resurfacing constructed by the Contractor which becomes necessary by reason of such settlement shall likewise be considered as a part of such required repair work unless the Contractor shall have obtained a statement in writing from the affected private owner or public agency releasing the OWNER from further responsibility in connection with such repair or resurfacing.
- C. The Contractor shall make all repairs and replacements promptly upon receipt of written order from the OWNER. If the Contractor fails to make such repairs or replacements promptly, the OWNER reserves the right to do the WORK and the Contractor and his surety shall be liable to the OWNER for the cost thereof.
- D. Comply with General Conditions and ordinances of local jurisdictions having authority.
- E. Make periodic inspections during guarantee period and correct defective work or correct defective work as directed by the OWNER or appropriate governing authority.

SECTION 01700 - CONTRACT CLOSEOUT

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

- END OF SECTION -

SECTION 01720 - RECORD DRAWINGS

PART 1 - GENERAL

101.01 RECORD DRAWINGS

A. The CONTRACTOR shall keep and maintain, at the job site, one record set of drawings. On these, it shall mark all project conditions, locations, configurations, and any other changes or deviations which may vary from the details represented on the Contract Drawings, including buried or concealed construction and utility features which are revealed during the course of construction. Special attention shall be given to recording the horizontal and vertical location of all buried utilities that differ from the locations indicated, or which were not indicated on the Contract Drawings, said record drawings shall be supplemented by any detailed sketches as necessary or directed to indicate, fully, the WORK as actually constructed. These master record drawings of the CONTRACTOR's representation of as-built conditions, including all revisions made necessary by addenda, change orders, and the like shall be maintained up-to-date during the progress of the WORK.

B. In the case of those drawings which depict the detail requirement for equipment to be assembled and wired in the factory, such as motor control centers and the like, the record drawings shall be updated by indicating those portions which are superseded by change order drawings or final shop drawings, and by including appropriate reference information describing the change orders by number and the shop drawings by manufacturer, drawing, and revision numbers.

C. Record drawings shall be accessible to the ENGINEER at all times during the construction period and shall be delivered to the ENGINEER upon completion of the WORK.

D. Requests for partial payments will not be approved if the record drawings are not kept current, and not until the completed record drawings, showing all variations between the WORK as actually constructed and as originally shown on the Contract Drawings or other Contract Documents, have been inspected by the ENGINEER.

E. Final payment will not be approved until the CONTRACTOR-prepared record drawings have been delivered to the ENGINEER. Said up-to-date, record drawings may be in the form of a set of prints with carefully plotted information overlaid in pencil.

F. Upon substantial completion of the WORK and prior to final acceptance, the CONTRACTOR shall complete and deliver a complete set of record drawings to the ENGINEER for transmittal to the OWNER, conforming to the construction records of the CONTRACTOR. This set of drawings shall consist of corrected plans showing the reported location of the WORK. The information submitted by the CONTRACTOR and incorporated by the ENGINEER into the Record Drawings will be assumed to be reliable, and the ENGINEER will not be responsible for the accuracy of such information, nor for any error or omissions which may appear on the Record Drawings as a result.

SECTION 01720 - RECORD DRAWINGS

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

- END OF SECTION -

SECTION 02590 - PROTECTION AND RESTORATION OF EXISTING IMPROVEMENTS

PART 1 - GENERAL

101.01 GENERAL

- A. The WORK of this section includes the restoration of all existing improvements damaged or altered by the construction of the project, at no additional cost to the OWNER.
- B. Existing improvements shall include but are not limited to facilities, structures, equipment, permanent surfacing, curbs, gutters, sidewalks, planted areas, ditches, driveways, culverts, fences, walls, signs, mailboxes, and sprinkling appurtenances. All improvements shall be reconstructed to equal or better, in all respects, the existing improvements removed. Said existing improvements shall be reconstructed in accordance with the notes and details shown on the drawings and/or the applicable provision of these Specifications.

101.02 QUALITY ASSURANCE

- A. Use adequate numbers of skilled workmen who are trained and experienced in the type of construction required.
- B. The quality of the finished restored improvement, as determined by the OWNER, shall be of equal or better quality than was said improvement prior to being damaged or removed.

PART 2 - PRODUCTS

202.01 MATERIALS - GENERAL

- A. As required to complete the restoration of existing improvements and shall be at least equal to original improvement at the time of damage or removal, as determined by the OWNER of said improvement, and shall match original construction in finish and dimension.
- B. Shall be in accordance with requirements of local jurisdiction having authority. Obtain approval of all materials from local jurisdiction having authority prior to ordering or delivering.

PART 3 - EXECUTION (Not Used)

- END OF SECTION -

SECTION 09900 - PAINTING AND FINISHES

PART 1 - GENERAL

101.01 DESCRIPTION

A. The WORK included in this section includes surface preparation, furnishing and applying paints and coatings to the exterior surfaces of piping, valves, and fittings located in vaults, or as indicated on the drawings.

101.02 REFERENCES AND STANDARDS

A. Work covered by this specification shall meet or exceed the provisions of the latest editions of the following codes and standards in effect at the time of award of the contract:

1. OSHA Occupation Safety and Health Act: State of Utah and Federal

101.03 SUBMITTALS

A. CONTRACTOR shall supply shop drawings for approval on all paint materials prior to installation.

PART 2 - PRODUCTS

201.01 PAINT, SEALERS AND SURFACE FINISH MATERIALS

A. Paint for Exposed Piping: Exposed metal piping, fittings and valves shall be coated with a high solids two component epoxy coating system. The epoxy coating shall be PPG AMERLOCK 400 or approved equal. Color to match existing piping.

B. Epoxy coating applied to immersed surfaces that contact potable water shall be NSF certified for potable water contact.

PART 3 - EXECUTION

301.01 SURFACE PREPARATION

A. All surfaces which receive paint or other coatings shall be prepared in accordance with the recommendations of the manufacturer of the material being used. Any loose coating, or corrosion scale on existing piping shall be completely removed with wire brushing, sand blasting or other approved methods.

SECTION 09900 - PAINTING AND FINISHES

301.02 APPLICATION

- A. Exposed metal piping, fittings and valves shall be painted in accordance with the manufacturer's recommendation and the resulting coating dry film thickness shall be not less than 7 mils.
- B. Field apply primer and topcoat to bolts (head & tail), nuts, fittings, and valves to match existing piping topcoat. Contractor shall not apply coating to equipment tags or name plates.
- C. Each coat shall be free of runs, skips or "holidays". All excess paint and/or drips on floors, walls, and other surfaces which are not designated for paint shall be removed.
- D. All work shall be done in accordance with the manufacturer's recommendation.

- END OF SECTION -

SECTION 15005 - PIPING GENERAL

PART 1 - GENERAL

101.01 SUMMARY

- A. The Contractor shall furnish and install all piping systems shown and specified, in accordance with the requirements of the Contract Documents. Each system shall be complete with all necessary fittings, hangers, supports, anchors, seismic restraints, expansion joints, flexible connectors, valves, accessories, heat tracing, insulation, lining and coating, testing, disinfection, excavation, backfill and encasement, to provide a functional installation.
- B. The piping shown is intended to define the general layout, configuration, routing, method of support, pipe size, and pipe type. The mechanical drawings are not pipe construction or fabrication drawings. It is the Contractor's responsibility to develop the details necessary to construct all mechanical piping systems, to accommodate the specific equipment provided, and to provide and install all spools, spacers, adapters, connectors, etc., for a complete and functional system.

101.02 REFERENCE SPECIFICATIONS, CODES, AND STANDARDS

- A. Without limiting the generality of other requirements of these specifications, all work specified herein shall conform to or exceed the applicable requirements of the referenced portions of the following documents to the extent that the requirements therein are not in conflict with the provisions of this Section.

- 1. Commercial Standards:

ANSI/ASME B1.20.1	Pipe Threads, General Purpose (inch)
ANSI B16.5	Pipe Flanges and Flanged Fittings, Steel Nickel Alloy and other Special Alloys
ANSI/AWWA C207	Steel Pipe Flanges for Water Works Service, Sizes 4 in through 144 in.
ANSI/AWS D1.1	Structural Welding Code
ASTM A 307	Specification for Carbon Steel Bolts and Studs, 6,000 psi Tensile
ASTM A 325	Specification for High-Strength Bolts for Structural Steel
ASTM D 2000	Classification System for Rubber Products in Automotive Applications

SECTION 15005 - PIPING GENERAL

101.03 CONTRACTOR SUBMITTALS

A. Shop Drawings

1. The Contractor shall submit shop drawings and certificates of all piping systems in accordance with the requirements in Section entitled Contractor Submittals, 01300.

101.04 QUALITY ASSURANCE

- A. NSF/ANSI 61 for Drinking Water System Components: All materials that will contact potable water shall comply with the requirements of the NSF/ANSI 61 Standard.

PART 2 - PRODUCTS

201.01 GENERAL

- A. Specials All pipes, fittings, and appurtenances shall be furnished in accordance with the requirements of this Section.
- B. Pipe Supports: All pipes shall be adequately supported and as indicated on the drawings.
- C. Lining: All requirements pertaining to thickness, applications, and curing of pipe lining, are in accordance with the requirements of the applicable Sections of Divisions 9 and 33, unless otherwise indicated.
- D. Coating: All requirements pertaining to thickness, application, and curing of pipe coating, are in accordance with the requirements of the applicable Sections of Division 33, unless otherwise indicated. Pipes above ground or in structures shall be field-painted in accordance with Section 09 90 00 Protective Coatings and Linings or 09 90 10 – Pipeline Coatings and Linings.
- E. Pressure Rating: All piping systems shall be designed for the maximum expected pressure as defined in Section 33 13 00 - Water Pipeline Testing and Disinfection, or as indicated on the piping schedule, or as indicated on the Drawings.

201.02 PIPE FLANGES

- A. Flanges: Where the design pressure is 150 psi or less, flanges shall conform to either ANSI/AWWA C207 Class D or ANSI B16.5 150-pound class. Where the design pressure is greater than 150 psi, up to a maximum of 275 psi, flanges shall conform to either ANSI/AWWA C207 Class E, Class F, or ANSI B16.5 150-pound

SECTION 15005 - PIPING GENERAL

class. However, AWWA flanges shall not be exposed to test pressures greater than 125 percent of rated capacity. For higher test pressures, the next higher rated AWWA flange or an ANSI-rated flange shall be selected. Where the design pressure is greater than 275 psi up to a maximum of 700 psi, flanges shall conform to ANSI B16.5 300-pound class. Flanges shall have flat faces and shall be attached with bolt holes straddling the vertical axis of the pipe unless otherwise shown. Attachment of the flanges to the pipe shall conform to the applicable requirements of ANSI/AWWA C207. Flanges for miscellaneous small pipes shall be in accordance with the standards specified for these pipes. Contractor to confirm flange compatibility of pipeline and adjoining equipment.

- B. Blind Flanges: Blind flanges shall be in accordance with ANSI/AWWA C207, or with the standards for miscellaneous small pipes. All blind flanges for pipe sizes 12 inches and over shall be provided with lifting eyes in form of welded or screwed eye bolts.
- C. Flange Coating: All machined faces of metal blind flanges and pipe flanges shall be coated with a temporary rust-inhibitive coating to protect the metal until the installation is completed.
- D. Flange Bolts: Unless otherwise noted, all pipe flange, fitting and coupling connection bolts shall be carbon steel per ASTM A307, Grade A hex bolts, with nuts per ASTM A563. All bolts, nuts and washers shall be zinc plated. Studs and bolts shall extend through the nuts a minimum of 1/4-inch and maximum of 1-inch. All-thread studs shall be used on all valve flange connections, where space restrictions preclude the use of regular bolts. For exposed pipe connections in structures, buried vaults, and manholes; prepare and coat bolts and nuts after installation with the same system as the adjacent flanged piping, in accordance with Section 09 90 00 – Painting and Coating.
- E. Insulating Flanges: Insulated flanges shall have bolt holes 1/4 inch diameter greater than the bolt diameter.
- F. Insulating Flange Sets: Insulating flange sets shall be provided by the Contractor where shown. Each insulating flange set shall consist of an insulating gasket, insulating sleeves and washers and a steel washer. Insulating sleeves and washers shall be one piece when flange bolt diameter is 1-1/2 inches or smaller and shall be made of acetal resin. For bolt diameters larger than 1-1/2 inches, insulating sleeves and washers shall be two-piece and shall be made of polyethylene or phenolic. Steel washers shall be in accordance with ASTM A 325. Insulating gaskets shall be full-face.
- G. Insulating Flange Manufacturers, or Equal

SECTION 15005 - PIPING GENERAL

1. JM Red Devil, Type E
 2. Maloney Pipeline Products Co., Houston
 3. PSI Products, Inc., Burbank, California.
- H. Flange Gaskets: Contractor shall provide flange gaskets for all pipe flanges. Gaskets for flanged joints shall be full-faced, 1/8-inch thick compressed sheets of asbestos-free aramid fiber base, with nitrile binder and nonstick coating, suitable for temperatures to 700 degrees F, a pH of 1 to 11, pressures to 1,000 psig, and NSF 61 approved. Blind flanges shall have gaskets covering the entire inside face of the blind flange and shall be cemented to the blind flange. Ring gaskets shall not be permitted.
- I. Flange Gasket Manufacturers, or Approved Equal
1. TEADIT, Style 1161/1082 San
 2. Garlock, Style 3760

201.02 THREADED INSULATING CONNECTIONS

- A. General: Threaded insulating bushings, unions, or couplings, as appropriate, shall be used for joining threaded pipes of dissimilar metals and for piping systems where corrosion control and cathodic protection are involved.
- B. Materials: Threaded insulating connections shall be of nylon, Teflon, polycarbonate, polyethylene, or other nonconductive materials, and shall have ratings and properties to suit the service and loading conditions.

201.03 SLEEVE TYPE COUPLINGS

- A. Sleeve-type Couplings (66 inch)
1. Construction: Sleeve-type couplings shall be provided where indicated, in accordance with ANSI/AWWA C219 unless otherwise indicated, and shall be of steel with 316 stainless steel bolts and hardware, without pipe stop, and shall be of sizes to fit the pipe and fittings. The middle ring shall be not less than 3/8 inch in thickness and shall be either 5 or 7 inches long for sizes up to and including 30 inches and 10 inches long for sizes greater than 30 inches, for standard steel couplings, and 16 inch long for long-sleeve couplings. The followers shall be single-piece contoured mill section welded and cold-expanded as required for the middle rings. They shall be of sufficient strength to accommodate the number of bolts necessary to obtain adequate gasket pressures without excessive rolling. The shape of the follower shall be of such design as to provide positive confinement of the

SECTION 15005 - PIPING GENERAL

gasket. Sleeve-type couplings shall be epoxy lined and coated at the factory and NSF 61 certified.

2. Pipe Preparation: The ends of the pipe, where indicated, shall be prepared for flexible steel couplings. Plain ends for use with couplings shall be smooth and round for a distance of 12 inches from the ends of the pipe, with outside diameter not more than 1/64 inch smaller than the nominal outside diameter of the pipe. The middle ring shall be tested by cold-expanding a minimum of one percent beyond the yield point, to proof-test the weld to the strength of the parent metal. The weld of the middle ring shall be subject to air test for porosity.
3. Gaskets: Gaskets for sleeve-type couplings shall be rubber-compound material that will not deteriorate from age or exposure to air under normal storage or use conditions. Gaskets for drinking water applications shall be NSF certified, Buna "N", grade 60, or equivalent suitable elastomer.
 - a. The rubber in the gasket shall meet the following specifications:
 - 1) Color – Jet Black.
 - 2) Surface – Nonblooming.
 - 3) Durometer Hardness – 74 " 5.
 - 4) Tensile Strength – 1,000 psi minimum.
 - 5) Elongation – 175 percent minimum.
 - b. The gaskets shall be immune to attack by impurities normally found in water. All gaskets shall meet the requirements of NSF 61, ASTM D 2000, AA709Z, meeting Suffix B13 Grade 3, except as noted above. All gaskets shall be compatible with the piping service and fluid utilized.
4. Insulating Couplings: Where insulating couplings are required, both ends of the coupling shall have a wedge-shaped gasket which assembles over a rubber sleeve of an insulating compound in order to obtain insulation of all coupling metal parts from the pipe.
5. Restrained Joints: All sleeve-type couplings on pressure lines shall be harnessed unless thrust restraints are provided by other means. Harnesses shall be in accordance with the requirements of the appropriate reference standard, or as shown.
6. Manufacturers, or Equal
 - a. Romac, Style 400
 - b. Smith-Blair, Style 411
 - c. Baker, Series 200

SECTION 15005 - PIPING GENERAL

201.04 FLANGED END CONNECTORS AND DISMANTLING JOINTS

- A. Flanged End Connectors and Dismantling Joints – Use at Flow Control Structure:
1. Flanged coupling adapters and dismantling joint couplings shall be in accordance with AWWA C219 and NSF 61 certified.
 2. Dismantling joints for connecting flanged pipe shall be AWWA C219 compliant. Provide studs and nuts to seal gasket separate and independent from tie-bar restraint system.
 3. All dismantling joints shall be the restrained type per AWWA M-11. Tie-bar restraint system shall conform to ASTM A193-B7 per AWWA M-11 and be designed to withstand the test pressure of 200 psi.
 4. All dismantling joints shall use standard flanges in accordance with AWWA C207. The thickness of the dismantling joint flanges shall be equal to or greater than the class of flanges that is connected to as required by the test pressure. Flanged coupling adapters and dismantling joints shall be epoxy lined and coated. Tie rods and fasteners shall be 316 stainless steel.
 5. Manufacturers, or Equal
 - a. Smith-Blair, Style 975
 - b. Baker, Series DJ
 - c. Romac, DJ 400

PART 3 - EXECUTION

301.01 GENERAL

SECTION 15005 - PIPING GENERAL

A. Unless otherwise provided, the Contractor shall furnish and install all fittings, closure pieces, bends, reducers, wyes, tees, crosses, outlets, manifolds, and other steel plate specials, bolts, nuts, gaskets, jointing materials, and all other appurtenances as shown and as required to provide a complete and workable installation. Where pipe support details are shown, the supports shall conform thereto and shall be placed as indicated; provided, that the support for all exposed piping shall be complete and adequate regardless of whether or not supporting devices are specifically shown. Where shown, concrete thrust blocks and welded joints shall be provided. At all times when the Work of installing pipe is not in progress, all openings into the pipe and at the ends of the pipe in trenches or structures shall be kept tightly closed to prevent entrance of animals and foreign materials. The Contractor shall maintain the inside of the pipe free from foreign materials and in a clean and sanitary condition until its acceptance by the Owner.

SECTION 15061 - STEEL PIPING, FABRICATED SPECIALS

PART 1 - GENERAL

101.05 THE REQUIREMENT

A. When required, the Contractor shall fabricate, install, and test all bends, reducers, wyes, tees, crosses, outlets, manifolds, and other steel plate specials, complete in place all in accordance with the requirements of the Contract Documents.

101.06 REFERENCE SPECIFICATIONS, CODES, AND STANDARDS

A. Without limiting the generality of other requirements of these specifications, all work specified herein shall conform to or exceed the applicable requirements of the referenced portions of the following documents to the extent that the requirements therein are not in conflict with the provisions of this Section.

1. Commercial Standards:

ANSI/AWWA C200-80	Steel Water Pipe 6 inches and larger
ANSI/AWWA C208-83	Fabricated Steel Water Pipe Fittings, Dimensions for.
ASTM A234/A234M-84a	Specification for Piping Fittings of Wrought Carbon Steel and Allow Steel for Moderate and Elevated Temperatures
AWWA M-11	Steel Water Pipe-A Guide for Design and Installation.

101.07 CONTRACTOR SUBMITTALS

A. Shop Drawings

1. The Contractor shall submit shop drawings and laying diagrams of all pipes, joints, bends, reducers, wyes, tees crosses, outlets, manifolds, and other steel plate specials in accordance with the requirements in Section entitled Contractor Submittals, 01300.

B. Design calculations shall be submitted to the Engineer for review prior to manufacture of pipe specials.

C. Certifications

SECTION 15061 - STEEL PIPING, FABRICATED SPECIALS

1. A certified affidavit of compliance shall be furnished for all steel plate specials and other products or materials furnished under this section of the specifications.

101.08 QUALITY ASSURANCE

A. Shop Testing of Steel Plate Specials

1. Upon completion of the welding, but prior to lining and coating, each steel plate special shall be bulkheaded and tested under a hydrostatic pressure of 1.5 times the design pressure; provided, that if straight pipe used in fabricating the specials has been previously tested and meets the requirements of the applicable piping Section, no further hydrostatic testing will be required; or provided, that all other welded seams are tested by the liquid penetrant inspection procedure conforming to ASTM 3 165, under Method B and Leak Testing or where applicable by the soap and compressed air method at an air pressure of 25 psi. Any pin holes or porous welds which may be revealed by the test shall be chipped out and rewelded and the pipe or fitting retested.

B. No outside mortar shall be applied over a seam prior to testing; however, mortar lining may be applied over a seam prior to hydrostatic testing, but under such conditions said pressure test shall be held on the pipe or fitting for a period of not less than 30 minutes.

PART 2 - PRODUCTS

201.01 GENERAL

A. Specials are defined as fittings, closure pieces, bends, reducers, wyes, tees, crosses, outlets, manifolds, and other steel plate specials located above ground or in structures.

201.02 DESIGN

A. Except as otherwise provided herein, materials, fabrication and shop testing of straight pipe shall conform to the requirements of ANSI/AWWA C200 and shall conform to the dimensions of ANSI/AWWA C208. The minimum thickness of plate for pipe from which specials are to be fabricated shall be the greater of that determined by the following 2 formulas:

$$(1) \quad T = \frac{P_w D / 2}{Y / S_w} \qquad (2) \quad T = \frac{P_t D / 2}{Y / S_t}$$

where T = Plate thickness in inches

D = Outside diameter of steel cylinder in inches

SECTION 15061 - STEEL PIPING, FABRICATED SPECIALS

P_w =	Design working pressure = 85 psi
P_t =	Design transient pressure for piping = (155 psi)
Y =	Yield point of steel in psi
S_w =	Safety factor of 2.5 at design working pressure
S_t =	Safety factor of 1.875 at design transient pressure

B. In no case shall the design stress at design work pressure (Y/S_w) for steel pipe exceed 16,500 psi or 22,000 psi at design transient pressure (Y/S_t), nor shall plate thickness be less than the thickness of adjacent mainline pipe or the following:

C. Pipe installed on saddle support shall be designed to limit the longitudinal bending stress to a maximum of 10,000 psi. Design shall be in accordance with the provisions of Chapter 7 of AWWA M-11.

201.04 FABRICATION AND MATERIALS

A. General

1. Reinforcement for wyes, tees, outlets, and nozzles shall be designed in accordance with AWWA Manual M-11. Reinforcement shall be designed for the design pressure specified or shown and shall be in accordance with the details shown on the Drawings. Specials and fittings shall be equal in pressure design strength and shall have the same coating as the adjoining pipe. Unless otherwise shown on the Drawings, the minimum radius of elbows shall be 2.5 times the pipe diameter and the maximum miter angle on each section of the elbow shall not exceed $11\frac{1}{4}$ degrees.

B. Specials and fittings that cannot be mechanically lined and coated shall be lined and coated by hand-application, using the same materials as are used for the pipe and in accordance with the applicable AWWA or ASTM Standards. Coating and lining applied in this manner shall provide protection equal to that specified for the pipe. Fittings may be fabricated from pipe that has been mechanically lined and/or coated. Areas of lining and coating that have been damaged by such fabrication shall be repaired by hand-applications in accordance with applicable AWWA or ASTM Standards.

C. Access manholes with covers shall be as detailed on the Drawings. All threaded outlets shall be forged steel suitable for 3000 psi service.

SECTION 15061 - STEEL PIPING, FABRICATED SPECIALS

D. Moderate deflections and long radius curves may be made by means of beveled joint rings, by pulling standard joints, by using short lengths of pipe, or a combinations of these methods; provided that pulled joints shall not be used in combination with bevels. The maximum total allowable angle for beveled joints shall be 5 degrees per pipe joint. The maximum allowable angle for recommendations or the angle which results from a 3/4-inch pull out from normal joint closure, whichever is less. All horizontal deflections or fabricated angles shall fall on the alignment. All vertical deflections shall fall on the alignment and at locations adjacent to underground obstructions, points of minimum earth cover, and pipeline outlets and structures, the pipe angle points shall meet the angle points shown on the Drawings.

E. Outlets, Tees, Wyes, and Crosses

1. Outlets 12-inch and smaller shall be fabricated from Schedule 40 or heavier steel pipe in the standard outside diameters, i.e., 12-3/4 inch, 10-3/4 inch, 8-5/8 inch, 6-5/8 inch, and 4-1/2 inch.

F. The design of outlet reinforcement shall be in accordance with the procedures given in Chapter 13 of AWWA Manual M-11, except that the design pressure P , used in the M-11 procedure shall equal the greater of

G. $1.25 P_w$ or $0.9375 P_t$. Unless otherwise shown on the Drawings, outlets 2 inches in diameter and smaller need not be reinforced.

H. In lieu of saddle or wrapper reinforcement as proved by the design procedure in Manual M-11, pipe or specials with outlets may be fabricated in their entirety of steel plate having a thickness equal to the sum of the pipe wall plus the required reinforcement.

I. Where required by the M-11 design procedure, crotch plate reinforcement shall be furnished.

J. Steel Welding Fittings

1. Steel welding fittings shall conform to ASTM A 234.

K. Flanges

1. Flanges shall conform to AWWA C207 Class D flange.

L. Lining

1. Fusion Bonded Epoxy Lining

SECTION 15061 - STEEL PIPING, FABRICATED SPECIALS

- a. All interior fittings/specials shall be lined with a Polyamide Epoxy system, fusion bonded epoxy system, or cement mortar in accordance with AWWA C205.

M. Coating

1. All requirements pertaining to thickness, application and curing of coating specified for straight pipe shall apply to specials. Coating system shall be in accordance with Section 09900.

N. A mark indicating the true vertical axis of the special shall be placed in the top and bottom of the special.

201.05 SLEEVE TYPE COUPLINGS

O. Sleeve-type Couplings (66 inch)

1. Construction: Sleeve-type couplings shall be provided where indicated, in accordance with ANSI/AWWA C219 unless otherwise indicated, and shall be of steel with 316 stainless steel bolts and hardware, without pipe stop, and shall be of sizes to fit the pipe and fittings. The middle ring shall be not less than 3/8 inch in thickness and shall be either 5 or 7 inches long for sizes up to and including 30 inches and 10 inches long for sizes greater than 30 inches, for standard steel couplings, and 16 inch long for long-sleeve couplings. The followers shall be single-piece contoured mill section welded and cold-expanded as required for the middle rings. They shall be of sufficient strength to accommodate the number of bolts necessary to obtain adequate gasket pressures without excessive rolling. The shape of the follower shall be of such design as to provide positive confinement of the gasket. Sleeve-type couplings shall be epoxy lined and coated at the factory and NSF 61 certified.
2. Pipe Preparation: The ends of the pipe, where indicated, shall be prepared for flexible steel couplings. Plain ends for use with couplings shall be smooth and round for a distance of 12 inches from the ends of the pipe, with outside diameter not more than 1/64 inch smaller than the nominal outside diameter of the pipe. The middle ring shall be tested by cold-expanding a minimum of one percent beyond the yield point, to proof-test the weld to the strength of the parent metal. The weld of the middle ring shall be subject to air test for porosity.
3. Gaskets: Gaskets for sleeve-type couplings shall be rubber-compound material that will not deteriorate from age or exposure to air under normal

SECTION 15061 - STEEL PIPING, FABRICATED SPECIALS

storage or use conditions. Gaskets for drinking water applications shall be NSF certified, Buna "N", grade 60, or equivalent suitable elastomer.

- a. The rubber in the gasket shall meet the following specifications:
 - 1) Color – Jet Black.
 - 2) Surface – Nonblooming.
 - 3) Durometer Hardness – 74 “ 5.
 - 4) Tensile Strength – 1,000 psi minimum.
 - 5) Elongation – 175 percent minimum.
 - b. The gaskets shall be immune to attack by impurities normally found in water. All gaskets shall meet the requirements of NSF 61, ASTM D 2000, AA709Z, meeting Suffix B13 Grade 3, except as noted above. All gaskets shall be compatible with the piping service and fluid utilized.
4. Insulating Couplings: Where insulating couplings are required, both ends of the coupling shall have a wedge-shaped gasket which assembles over a rubber sleeve of an insulating compound in order to obtain insulation of all coupling metal parts from the pipe.
 5. Restrained Joints: All sleeve-type couplings on pressure lines shall be harnessed unless thrust restraints are provided by other means. Harnesses shall be in accordance with the requirements of the appropriate reference standard, or as shown.
 6. Manufacturers, or Equal
 - a. Romac, Style 400
 - b. Smith-Blair, Style 411
 - c. Baker, Series 200

201.06 FLANGED END CONNECTORS AND DISMANTLING JOINTS

- P. Flanged End Connectors and Dismantling Joints – Use at Flow Control Structure:
 1. Flanged coupling adapters and dismantling joint couplings shall be in accordance with AWWA C219 and NSF 61 certified.
 2. Dismantling joints for connecting flanged pipe shall be AWWA C219 compliant. Provide studs and nuts to seal gasket separate and independent from tie-bar restraint system.

SECTION 15061 - STEEL PIPING, FABRICATED SPECIALS

3. All dismantling joints shall be the restrained type per AWWA M-11. Tie-bar restraint system shall conform to ASTM A193-B7 per AWWA M-11 and be designed to withstand the test pressure of 200 psi.
4. All dismantling joints shall use standard flanges in accordance with AWWA C207. The thickness of the dismantling joint flanges shall be equal to or greater than the class of flanges that is connected to as required by the test pressure. Flanged coupling adapters and dismantling joints shall be epoxy lined and coated. Tie rods and fasteners shall be 316 stainless steel.
5. Manufacturers, or Equal
 - a. Smith-Blair, Style 975
 - b. Baker, Series DJ
 - c. Romac, DJ 400

PART 3 - EXECUTION

301.01 GENERAL

Q. Unless otherwise provided, the Contractor shall furnish and install all fittings, closure pieces, bends, reducers, wyes, tees, crosses, outlets, manifolds, and other steel plate specials, bolts, nuts, gaskets, jointing materials, and all other appurtenances as shown and as required to provide a complete and workable installation. Where pipe support details are shown, the supports shall conform thereto and shall be placed as indicated; provided, that the support for all exposed piping shall be complete and adequate regardless of whether or not supporting devices are specifically shown. Where shown, concrete thrust blocks and welded joints shall be provided. At all times when the Work of installing pipe is not in progress, all openings into the pipe and at the ends of the pipe in trenches or structures shall be kept tightly closed to prevent entrance of animals and foreign materials. The Contractor shall maintain the inside of the pipe free from foreign materials and in a clean and sanitary condition until its acceptance by the Owner.

- END OF SECTION -

SECTION 15100 - VALVES AND ACTUATORS

PART 1 - GENERAL

101.09 THE REQUIREMENT

- A. The Contractor shall provide all tools, supplies, materials, equipment, and all labor necessary for furnishing, coating, installing, adjusting, and testing of all valves, actuators, and appurtenant work, complete and operable, all in accordance with the requirements of the Contract Documents. This section includes butterfly valves with electronic mechanical actuators.
- B. All valves shall be furnished with pressure classes equal to or better than the pressure class of the pipe with which the valves are to be used. Unless otherwise specified, each valve body shall be tested under a test pressure equal to twice its design water-working pressure.

101.10 RELATED WORK SPECIFIED ELSEWHERE

- A. Protective Coating: 09900

101.11 REFERENCE SPECIFICATIONS, CODES, AND STANDARDS

- A. Codes

ANSI/NFPA 70-National Electrical Code

- B. Commercial Standards:

ANSI B16.7-75	Cast Iron Pipe Flanges and Flanged Fittings, Class 25, 125, 250, and 800.
ANSI B16.5-81	Pipe Flanges and Flanged Fittings, Steel Nickel Alloy and Other Special Alloys.
ASTM A 48-83	Specification for Gray Iron Castings
ASTM B 62-82a	Specification for Composition Bronze or Ounce Metal Castings.
ASTM A 536-84	Specification for Ductile Iron Castings.

101.01 CONTRACTOR SUBMITTALS

- A. Shop drawings of all valves and actuators shall be furnished as specified in Section entitled, Contractor Submittals 01300
- B. The Contractor shall submit a schedule of valves to be labeled indicating in each case the valve location and the proposed working pressure for the label.

SECTION 15100 - VALVES AND ACTUATORS

PART 2 - PRODUCTS

201.01 DOUBLE OFFSET BUTTERFLY VALVES

- A. General: The butterfly valve shall be designed expressly for waterworks applications. Valves shall meet or exceed the requirements of AWWA C504-15. Valves shall be of the size and class indicated in the drawings. All valves shall be of the AWWA C504-15 "B" Designation, bubble tight and sized for bi-directional water service, full rated pressure, and a line velocity of 16 feet per second. The butterfly valve shall be of the double offset design. Zero and single offset butterfly valve designs are not acceptable. The valve build data shall be made available upon request by the Owner and shall be retained by the Valve Manufacturer for no less than 50 years unless noted longer. Actuators shall be sized for conditions given in Valve Schedule.
- B. Pressure Class: Butterfly valves shall conform to ANSI/AWWA C504-15 Class 150B.
- C. Flanges: Flanges shall be in conformance with ASME B16.1 Class 125. Flange faces shall be coated in accordance with Section 2.A.(18) Paint and Coatings. Flanges shall also have machined grooves to improve gasket sealing.
- D. Valve Lay Length: Flanged valve lay lengths shall be in accordance with AWWA C504-15, Table 1 short bodied valves.
- E. Body: Valve bodies shall be ductile iron, ASTM A536 65-45-12. Carbon steel and Cast Iron are not acceptable material for the valve body.
- F. The entire valve body, excluding shaft bores, shall be coated for corrosion protection.
- G. Valve Tags: Valves shall be equipped with mechanically fastened stainless steel stamped or engraved tags as detailed in Section 2.A.(19) Marking. Painted lettering on tags will not be accepted.
- H. Disc: The disc shall be ductile iron ASTM A536 65-45-12 or ASTM A536 60-40-18. Unless stainless steel, the entire disc and all its wetted surfaces shall be coated, without exception, in accordance with Section 2.A.(18) Paint and Coatings. Disc pins shall extend completely through the valve and shall be mechanically fastened, and O-Ring sealed and shall be ASTM A240 Type 2205 Duplex Stainless Steel. Carbon steel is not an acceptable material for the valve disc.
- I. Shaft: Shafts shall stainless steel and meet or exceed the requirements of AWWA C504-15.
- J. Elastomeric Seat: Valve seats shall be field replaceable and shall be secured to the valve disc by a 316-stainless steel seat retainer ring and secured by 316 stainless steel fasteners. Bronze and carbon steel seat retainer rings are not acceptable. Elastomeric valve seats shall be field replaceable in-line without having to remove the valves from service. The elastomeric seat material shall

SECTION 15100 - VALVES AND ACTUATORS

be EPDM. The valve shall be bi- directionally leak free in accordance with AWWA C504-15. The field replaceable seat shall not require special skills or tools to replace the seal. Elastomeric seat methods which use either irreplaceable vulcanized seats or which use hardened epoxy or grout in a dovetailed groove are not acceptable. Elastomeric seats with seams are not allowed.

- K. **Metallic Seating Surface:** The metallic seating surface shall be located in the valvebody. Seating surfaces shall be a highly wear resistant, double overlay welded 316 Stainless Steel in accordance with AWWA C504-15. The seat shall be applied through a high alloy weld overlay process and shall have a final surface minimum thickness of no less than 7 mils (0.18mm) in accordance with AWWA C504-15. Replaceable metallic seating surfaces in the body are not acceptable.
- L. **Shaft Seals:** Shaft seals shall be appropriate for service specified. Shaft seals shall be composed of a minimum of 8 O-ring seals protecting both the OD and ID of the shaft bearings Elastomer packing material shall be EPDM. Shaft Seals shall be clearly shown on submittal drawings. Packing will not be allowed.
- M. **Shaft Bearings:** Valve shaft bearings or radial shaft bushings shall meet or exceed the requirements of AWWA C504-15 and be corrosion resistant, self-lubricating sleeve type made of lead-free bronze.
- N. **Thrust Bearings:** Valve thrust bearings shall be provided and shall meet or exceed the requirements of AWWA C504-15.
- O. **Hardware:**
 - a. All fasteners and hardware shall be type 316 stainless steel.
 - b. Bolt sizes for all tapped holes shall be identified.
- P. **Paint and Coatings:**
 - a. All valves shall be NSF/ANSI 61 certified.
 - b. All sharp edges to be coated shall have the necessary beveling or long radius to assure consistent coating thickness.
 - c. Any damage found after shipping shall be noted to the carrier and the Valve Supplier. Coating damaged in shipping shall be noted and properly field repaired by the Valve Manufacturer's Representative to the satisfaction of the Owner.
 - d. The Valve Manufacturer is required to have and follow a system of valve preparation and coating which assures a quality holiday free application and shall comply with the requirements of AWWA C550. The coating system shall be submitted for approval.
 - e. Coatings shall be either of the following:
 - i. An Owner approved 390-degree F plus, heat bonded fusion

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coated to a final dry film thickness no less than 12 mils.

- ii. An Owner approved two-part liquid epoxy. A minimum of two separate 6 mill coats to a final dry film thickness DFT of no less than 12 mils.

Q Marking:

- a. All parts subject to disassembly prior to shipment shall be marked for identification and match marked. Match marking information shall be submitted in the O&M manual.
- b. Casting markings shall conform to the appropriate section of MSS-SP-25. Each valve shall be marked with the Valve Manufacturer's name, valve size, body material, and pressure rating cast into the body of the valve. Lettering shall be a minimum of ½ inch tall and project a minimum of 1/10 inch from the body.
- c. Each individual piece of equipment shall bear a stainless-steel nameplate attached with stainless steel screws or rivets, upon which there shall be engraved or stamped the following minimal information. Painted lettering on tags shall not be accepted.
 - i. Valve Manufacturer's name or trademark
 - ii. Valve Manufacturer's serial number
 - iii. Valve Size
 - iv. Valve Pressure Rating

R Approved Valve Manufacturers

- a. Av-Tek DEX
- b. VAG - EKN

S Valve Manufacturer Warranty:

- a. The Valve Manufacturer shall warrant all valves against material and workmanship defects for a period not less than 12 months. The warranty period shall start at installation or at no more than two months from delivery; whichever comes first. Any valve component failure during the warranty period shall be corrected by the Valve Manufacturer.
- b. The Valve Manufacturer shall have an authorized warranty service center within the continental United States of America.

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201.04 ELECTRIC MOTOR VALVE ACTUATORS

- A. The actuator for BFV-4 shall be suitable for inching/positioning service. The actuator for BFV-1, BFV-2, and BFV-3 shall be suitable for operation of a quarter turn valve and be rated for 60 starts per hour, as a minimum. The actuator is required to drive the valve to any position (fully open, intermediate, and fully closed).
- B. The actuators shall be self-contained units consisting of electric motor, integral reversing contactor starter, gearbox, limit switches, torque switches, manual override handwheel with declutching lever, and other devices as specified.
- C. The actuator for BFV-4 shall be furnished and sized by the valve supplier and shall be factory mounted. The actuator for BFV-1, BFV-2, and BFV-3 shall be sized assuming the torque requirements of the existing valve are two times a standard AWWA butterfly valve.
- D. The actuators shall be sized to produce at least 1.8 times the operating torque required. Stall torque of motor shall not exceed the torque capacity of the valve.
- E. The actuators shall comply with AWWA C540. Manufacturer shall provide certified drawings and affidavit of compliance as specified in AWWA C540.
- F. Operating time for the actuators shall be per valve schedule.
- G. The actuator motor and all electrical enclosures shall be NEMA 4X, as a minimum. The control enclosure shall include a space heater.
- H. Motors shall be specifically designed for valve actuator service and shall be high starting torque, totally enclosed, nonventilated construction.
- I. Motors shall operate on 480-volt, 3-phase, 60-Hz power for the 66-inch valve. Motors shall operate on 240-volt, 3-phase, 60-Hz power for the 30-inch and 42-inch valves.
- J. Motor insulation shall be NEMA Class F, as a minimum.
- K. Motors shall be equipped with internal temperature relay to protect against motor overheating.
- L. Gearing:
 - a. All gearings shall be of steel construction.
 - b. Actuators shall be permanently lubricated at the factory. Lubrication shall be suitable for operation at any angle and in ambient temperatures of -20 degrees F to 140 degrees F
- M. The drive shall include a lost motion device with hammer blow effect to allow

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the motor to reach full speed before engaging the valve load.

- N. Actuators controls for BV-1, BV-2, and BV-3 shall be provided with a remote mount kit with display indicating valve position, a LOCAL/OFF/REMOTE weatherproof selector switch or pushbutton and an OPEN/STOP/CLOSE weatherproof selector switch or pushbutton.
- O. Actuator controls for BV-4 shall include a LOCAL/OFF/REMOTE weatherproof selector switch or pushbutton and an OPEN/STOP/CLOSE weatherproof selector switch or pushbutton.
- P. In the LOCAL position, the actuator shall be controlled by the OPEN/STOP/CLOSE switch. Motor shall drive the valve to its fully OPEN or CLOSED position when the pushbutton is momentarily depressed. Motor shall stop in mid-travel when the stop button is depressed.
- Q. In the REMOTE position, the actuator shall accept a momentary contact OPEN/CLOSE control signal and drive the valve to its fully OPEN or CLOSED position.
- R. Provide a Form C dry contact for remote indication of the REMOTE status of the selector switch.
- S. Provide Form C dry contacts to remotely indicate if the valve is in either the FULLY OPENED or FULLY CLOSED position.
- T. The actuators shall be equipped with automatic double-acting limit switches capable of being field adjusted to trip at any point between FULLY OPENED and FULLY CLOSED valve positions.
- U. The actuators shall be equipped with automatic double-acting torque switches. Torque switches shall operate during the complete valve cycle to protect the valve and actuator from excessive loads caused by obstructions in either direction of travel.
- V. The actuators shall be equipped with handwheels for manual operation and shall include an automatic clutch to positively disengage the handwheel at any time the drive motor control is energized. Handwheel operator shall be designed in such a way that failure of the motorized gearing shall not prevent hand operation of the valves.
- W. Actuators shall include a mechanical indicator that will provide continuous visual indication of valve position. In addition, actuators shall be equipped with replaceable LED indicating lights that will indicate if the valve is in either the FULLY OPENED or FULLY CLOSED position.
- X. Actuators shall be supplied with a control power transformer.
- Y. Failure Position: Valve actuators shall fail in the last position on loss of power or control signal.

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Z Manufacturer, Or Approved Equal:

i. AUMA

ii. Rotork

PART 3 - EXECUTION

301.01 VALVE INSTALLATION

- A. All valves, gates, operating units, stem extensions, valve boxes, and accessories shall be installed as shown and specified. Valves shall be firmly supported to avoid undue stresses on the pipe.
- B. All valves and actuators shall be installed to provide easy access for operation and maintenance and to avoid conflicts between valve operators and structural members or handrails.
- C. Where combinations of valves, sensors, switches, and controls are specified, it shall be the responsibility of the Contractor to properly assemble and install these various items so that all systems are compatible and operating properly. The relationship between interrelated items shall be clearly noted on shop drawing submittal.
- D. Instruction of Owner's Personnel: The authorized service representative shall visit the Site for not less than 1 Day to instruct the Owner's personnel in the operation and maintenance of the actuated valves.

ELECTRIC MOTOR ACTUATOR VALVE SCHEDULE				
Valve ID	Valve Size (in)	Working Pressure (psi)	Service	Travel Time (Minutes)
BFV-1	30	85	Open/Close	10 to 12
BFV-2	30	85	Open/Close	10 to 12
BFV-3	42	85	Open/Close	12 to 15
BFV-4	66	25	Open/Close	25 to 30

- END OF SECTION -

SECTION 15105 - METERS

PART 1 - GENERAL

101.01 THE REQUIREMENT

A. The Contractor shall provide all tools, supplies, materials, equipment and all labor necessary for installing, adjusting, and testing of all meters and appurtenant work, complete and operable, all in accordance with the requirements of the Contract Documents.

101.02 RELATED WORK SPECIFIED ELSEWHERE

A. Pipe, Fittings, Valves and Operators:

Section 15005 as applicable.

101.03 REFERENCE SPECIFICATIONS, CODES, AND STANDARDS

A. Codes

ANSI/NFPA 70-1984 National Electrical Code

B. Commercial Standards:

ANSI B16.5-81

Pipe Flanges and Flanged Fittings, Steel Nickel Alloy and Other Special Alloys.

101.04 CONTRACTOR SUBMITTALS

A. Shop drawings of all meters shall be furnished as specified in Section entitled, Contractor Submittals 01300

B. Contractor shall provide manufacturer order codes for the magnetic flow meters

PART 2 - PRODUCTS

201.01 MAGNETIC FLOW METERS

A. Magnetic flow meters shall measure, indicate, and transmit the flow of a conductive process liquid in a full pipe. Standard output shall be MODBUS RS485 and have remote mounted transmitter with a liquid crystal display reading in million gallons per day. The meter shall also have a scalable totalizer (with pulsed output), and non-full pipe detection. Flow meters shall be rated at minimum 150 psi. Meters

SECTION 15105 - METERS

shall have a minimum of 2 self-cleaning electrodes, self-diagnostics and automatic data checking. CONTRACTOR shall field verify length of cable for connection.

- B. Flanged connections shall be constructed of carbon steel, ANSI B16.5 Class 150 or ANSI/AWWA C207 Class D.
- C. Flow meter shall be NSF 61 certified.
- D. Liner shall be polyurethane or PTFE and electrodes stainless steel suitable for potable water service.
- E. Meter shall be rated for NEMA 6/IP68 for submersible operation.
- F. Meters shall include grounding rings, material type 316 stainless steel, per the manufacturer's recommendations.
- G. Flow meter shall have an option for process calibration and diagnostics.
- H. The flow measuring system shall conform to the following:
 - a. Time constant: 0.5 to 1000 seconds; galvanic or optic isolation
 - b. Accuracy: 0.50 percent of flow rate from velocities 2 feet to 30 feet per second.
 - c. Repeatability: 0.25 percent of full scale
 - d. Power consumption: 30 watts or less
 - e. Power requirements: 24 VDC, plus or minus 10 percent, unless indicated otherwise on the Contract Drawings. Battery powered flow meters will not be accepted.
- I. Magnetic flow meters shall be Proline Promag W400 by Endress+Hauser, 8750 Series by Rosemount, no equal.

- END OF SECTION -